

VOLUME II

# **CONSTRUCTION SPECIFICATIONS AND DRAWINGS**



**Replacement of a  
Runway VISUAL RANGE (RVR)  
to serve RWY 20  
at the  
Walla Walla Regional Airport**

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## **SECTION 01010**

### **SUMMARY OF WORK**

## **SECTION 01010**

### **SUMMARY OF WORK**

#### **PART 1 GENERAL**

##### **1.1 SCOPE OF WORK**

The work covered under this specification includes the replacement of a Runway Visual Range (RVR) system to serve runway 20 at Walla Walla Regional Airport, Walla Walla, WA.

The contractor is required to furnish all labor, materials (except Government Furnished Material, GFM), services, equipment, insurance, bonds, security notifications, licenses, permits, and fees in accordance with applicable federal, state and local regulatory requirements to complete the specified work. Any miscellaneous labor, equipment and/or materials not specifically detailed or specified, but required to complete the project, shall be provided as an integral part of the work.

The dimensions, measurements, and quantity of materials listed in this specification and on the construction drawings are estimated and are presented to give the contractor an idea of the total scope of work. The contractor is strongly encouraged to make a site visit to verify the existing conditions, quantities of materials, and amount of work required. The contractor is responsible for assuring that the bid reflects all work required to accomplish this project. Coordinate site visit with the FAA Project Engineer in Renton, WA, Jim Baggs, (425) 227-1345, and/or Victor Livengood, in Walla Walla, at (509) 727-2461.

##### **1.1.1 Installation of the replacement RVR**

Contractor shall install the RVR SIE boxes on the new rack on the airfield and in the airport lighting vault as indicated on the construction drawings. Work includes but is not limited to: removal of the existing airfield RVR equipment, equipment mounts and concrete foundations; constructing a new foundation for the RVR rack and LIR pole; constructing a new power/equipment rack for the RVR; construction of an EES grounding system; procurement and installation a new LIR pole, mounting stand, maintenance stand and tilt down device for mounting the VS sensor; installation of a new hand hole, conduit and wiring as shown on the drawings for power and control wiring; construction of new conduit and wire in the airport lighting vault; site work; and installation of the Government Furnished RVR boxes and equipment at the field site and in the airport lighting vault.

##### **1.2 REFERENCES**

Airport Ground Vehicle Operations Guide available from:

[http://www.faa.gov/airports/airport\\_safety/call\\_to\\_action/media/airport\\_ground\\_vehicle\\_guide.pdf](http://www.faa.gov/airports/airport_safety/call_to_action/media/airport_ground_vehicle_guide.pdf)

FAA-C-1217f	Specification for Interior Electrical Work
FAA-C-1391b	Specification for Underground Cables
FAA-STD-019e	Lightning protection, grounding and bonding
NWD-643-42203-01	PLOT PLAN FOR EXISTING RVR
NWD-643-42203-05	RVR TOWER DETAILS

### 1.3 DRAWINGS

Callouts on the construction drawings indicate work to be done under this contract unless specifically noted "installed by others" or "existing". Callouts indicating work to be done do not always include the word "install".

#### 1.3.1 Construction Drawings Provided

Drawings applicable to this project are listed below. The written scale (e.g. 1"=100') is only valid for FAA "D - size" drawings (22"x34") and may be slightly off due to variations in printing. On reduced size drawings, the bar scales (where shown) and written dimensions remain valid.

ALW-D-RVR20-G001	COVER SHEET
ALW-D-RVR20-G002	SITE LOCATION PLAN
ALW-D-RVR20-C001	PLOT PLAN
ALW-D-RVR20-C002	FOUNDATION PLAN AND DETAILS
ALW-D-RVR20-C003	RVR EQUIPMENT RACK DETAILS
ALW-D-RVR20-C004	ALS & RLIM SENSOR DETAILS
ALW-D-RVR20-C005	MISCELLANEOUS DETAILS
ALW-D-RVR20-C006	LIGHTING VAULT DETAILS
ALW-D-RVR20-E001	ELECTRICAL PLOT PLAN
ALW-D-RVR20-E002	PANEL, POWER & CONTROL WIRING

#### 1.3.2 As-Built Drawings

The contractor shall provide three complete sets of As-Built drawings to the FAA Project Engineer at the end of the project. The following color codes shall be used:

Green -to indicate new or changed information

Red - to indicate deletions

Blue - to indicate notes to the draftsman

Any additional diagrams and/or schematics that would be helpful for the maintenance of the facility should also be included.

### 1.4 SUBMITTALS

#### **1.4.1 Material**

The contractor shall submit for approval; catalog data, cut-sheets, samples, and any other relevant information on the contractor furnished material to be used on this project. Two copies of the submittal package shall be given to the FAA Project Engineer for approval. Submittals on materials shall include, but is not limited to:

- Galvanized rigid steel conduit, vinyl coated or tape wrapped.
- PVC Conduit
- Cement concrete material.
- Geotextile fabric.
- Aggregate material.
- Contractor furnished hardware.
- Contractor furnished electrical panels, fittings and components.
- Contractor furnished cable and wire.
- Labels.
- Anti-corrosion product for threaded hardware.
- Hand holes and junction cans.
- Additional items deemed necessary by the Project Engineer.

#### **1.4.2 Schedule**

Prior to start, the contractor shall submit a schedule and work plan to the Project Engineer for approval. See section 3.1.2 for the maximum time allowed to complete this project. The schedule shall show start dates, duration, and finish dates for each work activity. Activities shall include, but are not limited to:

- Site layout.
- Site work
- Foundation installation
- Installation of power and control for the RVR.
- Installation of the VS/ALS SIE boxes for the RVR.
- Installation of the RLIM SIE box for the RVR
- Inspection and cleanup.

The FAA reserves the right to modify the contractor's sequence of activities in the interest of facility operation and airport safety.

#### **1.4.3 Schedule of Values**

The contractor's proposal shall include a schedule of values, showing at a minimum, a breakdown of cost for each work activity listed in the work schedule / below. Cost for each item should include any profit and overhead.

• Site layout.	\$ . .
• Installation of power and control for the RVR	\$ . .
• Installation of the RVR VS/ALS SIE boxes.	\$ . .
• Installation of the RVR RLIM SIE boxes.	\$ . .
• Site work.	\$ . .
• Inspection and cleanup.	\$ . .
<b>TOTAL PROJECT COST</b>	<b>\$ . .</b>

#### 1.4.4 Safety Plan

The contractor shall submit a safety plan per paragraph 3.4.2.6 of this section.

#### 1.4.5 Work Plan

The contractor shall submit a work plan per paragraph 3.4.5 of this section.

#### 1.4.6 Testing

The contractor shall complete, at his own expense, all testing as required by these specifications. The results shall be submitted to the FAA Project Engineer. Required testing includes, but is not limited to, the following:

- Cable insulation resistance test (see FAA-C-1217f, 5.3.4)
- Earth resistance test (see FAA-C-1217f, 5.3.6)

## PART 2 PRODUCTS

Reference herein or in the construction drawings to any specific commercial product, process, or service, any trade name, trademark, manufacturer, or otherwise, does not necessarily constitute or imply its endorsement, recommendation, or favoring by the Federal Aviation Administration. The contractor may submit a request for substitution of a product, process, or service specifically called out. Such request shall be through the submittal process.

### 2.1 GOVERNMENT FURNISHED MATERIAL

Government furnished material (GFM) for this project is listed as follows:

List is for a single RVR:

<u>QTY</u>	<u>ITEM</u>
1 ea.	RVR VS SIE box
1 ea.	RVR ALS SIE box
1 ea.	RVR RLIM SIE box
1ea.	RVR VS sensor

- 2 ea. RVR VS cables
- 1ea. RVR ALS sensor
  
- 1 ea. RVR ALS cable
- 1ea. RVR RLIM current sensor and RLIM cable

### 2.1.1 Inventory and Inspection of GFM

The contractor shall sign a copy of the Government furnished material (GFM) list acknowledging receipt of the furnished material, noting any discrepancies if necessary. When the contractor signs for custody, he acknowledges receipt in good condition and assumes responsibility for any subsequent loss or damage. The contractor shall return all GFM that is not installed to the location where the material was picked up.

## 2.2 CONTRACTOR FURNISHED MATERIAL

The contractor shall furnish all material that is required and not otherwise indicated to be Government furnished. Materials furnished by the contractor shall be new, the standard products of manufacturers regularly engaged in the production of such materials, and of the manufacturer's latest designs that comply with the specification requirements.

The contractor is responsible for making their own arrangements for material delivery and receiving. The contractor shall not have any material delivered to any FAA offices. Delivery to the Airport address shall only be done with the prior approval of the airport management.

The list of contractor furnished material includes, but is not limited to:

- 3'x3'x2.5' deep H-20 rated pull box with spring assisted lid
- Concrete, re-bar, anchor bolts, cable markers, etc.
- Power, control, and grounding cable, as required.
- Ground rods, #1/0 bare copper guard wire, #4/0 bare copper wire for EES, exothermic welds and misc. hardware for grounding system.
- Geotextile fabric, as required.
- Aggregate material, as required.
- Coated galvanized rigid metal conduit, EMT, HDPE and PVC conduit as required.
- Pipe wrap for galvanized rigid metal conduit.
- Electrical fittings and components, as required.

- Misc. hardware and Unistrut, as required.
- Labels for electrical components, cables, pull boxes, etc.
- Floor flanges, as required.
- 60 Amp Heavy duty safety switch (fused at 30 amps).
- 30 Amp Heavy duty safety switch (fused at 30 amps).

## **2.3 MATERIAL**

### **2.3.1 External Hardware**

All external hardware shall be hot dipped galvanized, stainless steel, or approved for long term outdoor use. All cut edges shall be filed smooth and treated with a cold galvanizing compound.

### **2.3.2 Anti-oxidant compound**

Use an anti-oxidant compound on all external threads, insertions, and connections.

### **2.3.3 Asbestos Free Material**

The Contractor shall not use any asbestos containing material (ACM) at any time during the construction. The Contractor shall verify that all material, including those supplied by third parties, are asbestos free materials. A written certification letter shall be provided by the Contractor to the FAA certifying that the finished work is asbestos free.

## **PART 3 EXECUTION**

### **3.1 SCHEDULES**

#### **3.1.1 Work schedule**

All work hours shall be coordinated with the Project Engineer. No work shall be scheduled on Saturdays, Sundays or legal holidays without prior approval from the FAA Project Engineer. Contractor is to access the site from the gate specified by the airport manager.

The contractor shall furnish the Resident Engineer with emergency (24 hour) contact phone numbers for the contractor's superintendent and an alternate individual. Such numbers will be used if the contractor needs to be contacted outside of normal working hours

#### **3.1.2 Construction Schedule**

All work shall be completed between 4 June 2012 and 16 July 2012.



### **3.1.3 Weekly Look Ahead Work Schedule**

On a weekly basis, the contractor shall submit a schedule showing activities desired to be performed during the upcoming week. These work activities shall be approved by the FAA Project Engineer.

### **3.1.4 Deviation from Work Schedule**

The Airport Manager and the FAA Project Engineer reserve the right to suspend or stop construction as necessary for the safety of aircraft or airport property. In addition, the FAA may adjust the work hours to satisfy the facility operations.

### **3.1.5 Daily Construction Log**

The Contractor shall keep a Daily Construction Log. At a minimum, the daily log shall contain:

- Items accomplished for that day.
- Start and stop time of work.
- Name of workers (including sub-contractors), and hours they worked for that day.
- Weather (including sky, ground moisture conditions, and temperature).
- Material received.
- Documents and photographs showing the progress of work, and as required.

The Daily Construction Logs shall be turned over to the FAA Project Engineer on a weekly basis.

## **3.2 PRE-CONSTRUCTION MEETING**

Prior to the start of any work and the contractor's access to the work site, the contractor shall be required to attend a pre-construction meeting. Attendees at the meeting may include, but is not limited to, the FAA Project Engineer, Resident Engineer, FAA Contracting Officer, the Airport Manager, Airport Operations, FAA maintenance, and other interested parties as determined by the Project Engineer. Topics at the meeting will include: site access, airport security, work safety, work schedule, project expectations, work procedures, emergency plans, and other items relating to the execution of the project.

## **3.3 LAYOUT**

The contractor shall verify the field measurements and coordinates indicated on the drawings with the FAA Project Engineer before starting any layout. The contractor shall lay out his work from base lines and bench marks indicated on the drawings and shall be responsible for all measurements in connection therewith. The contractor shall furnish, at his own expense, all stakes, templates, platforms, equipment, tools, materials and labor as may be required in laying out any part of the work. All layout work shall be accomplished by a Professional Land

Surveyor. The contractor is to properly maintain the specified layouts to assure proper alignment of the construction. Roads indicated to be installed under this contract shall be laid out and clearly marked at the beginning of the project and used as access roads during construction so as to minimize the disturbance to the surrounding areas.

### **3.4 SPECIAL REQUIREMENTS**

#### **3.4.1 Special Precautions**

The contractor shall conform to the rules and regulations of the airport and shall coordinate all work with the FAA Project Engineer.

Note: Unscheduled interruptions of the electrical service to FAA facilities may cause aircraft accidents and loss of life. Work requiring a temporary or permanent de-energization of equipment shall be scheduled in writing with the FAA Project Engineer and the onsite FAA maintenance personnel. Only onsite FAA maintenance personnel are authorized to energize/de-energize equipment, or to operate a circuit breaker, switch, or fuse in an FAA facility.

#### **3.4.2 Safety Requirements**

Aviation Safety is a primary consideration during airport construction. The Contractor is completely responsible for complying with the Airport's safety and operation procedures, as dictated by the Airport.

During the performance of this contract, the airport runways, taxiways, and aircraft parking aprons shall remain in use by aircraft to the maximum extent possible, CONSISTENT WITH CONTINUAL SAFETY. The contractor shall not allow employees, subcontractors, suppliers, or any other unauthorized person to enter or remain in any airport area which would be hazardous to persons or to aircraft operations.

##### **3.4.2.1 Runway Safety and Object Free Areas**

The Runway Safety Area (RSA) for runway 20 at Walla Walla Regional Airport is 500' wide and extends 1000' past the threshold of Runway 20.

Prior to commencement of work, the contractor shall delineate the boundaries of the safety area in the area of the work with 3/8" x 1 1/2" x 4' long pointed lath (survey sticks) and bright orange flagging.

The contractor shall not be allowed into the Runway Safety Area without prior approval from the FAA Project Engineer and the Airport Manager. In general, no workers or equipment shall be allowed inside the safety area when aircraft are using the runway. Work to be done inside the safety area shall be scheduled and closely coordinated with the FAA Project Engineer and the Airport manager.

The contractor shall not be allowed to place vehicles and/or equipment inside the Runway Object Free Area (OFA) without the approval of the FAA Project Engineer. Vehicles shall be parked 400' from the runway centerline. Work items can be transported to the work area, but the vehicle will be removed to the 400' point immediately after unloading.

In addition to the restrictions of working in the Runway Safety area and Object Free Area, the Airport Manager and/or the FAA Project Engineer may impose more restrictive requirements as needed to maintain airport safety.

#### **3.4.2.2 Approach Surface**

No vehicles or equipment shall be permitted to penetrate an approach surface (extended along the runway centerline) of 20:1 for visual runways, 34:1 for runways with a non-precision approach, or 50:1 for runways with an operational ILS. The approach surface begins at the runway threshold centerline elevation and starts 200 ft downwind from the threshold (or from the location of the Displaced/Relocated threshold).

#### **3.4.2.3 Construction Vehicle Traffic**

The contractors' vehicles and equipment shall enter the work site and construction areas at approved locations, and by way of authorized routes. The use of runways, aprons, taxiways, ramps, will not be permitted unless specifically approved by the FAA Project Engineer and the Airport Manager. The contractor shall inform all personnel that aircraft have the right-of-way at all times. The contractor shall be responsible for maintaining control and security at each entry point, as approved.

As a minimum, all vehicles and motorized equipment that enter the Airport Operations Area (AOA) shall be marked per AC 150/5210-5B (or latest version). In general, all vehicles and motorized equipment inside the AOA shall be marked with a three foot by three foot flag with international orange and white 12 inch squares displayed in full view above the vehicles. At night, or during periods of low visibility, all vehicles and equipment operating in the AOA shall be identified with an approved yellow flashing beacon.

In addition, no personnel will be permitted to drive on the airside of the airport unless he/she has read, and certified that he/she has read, "A Guide to Ground Vehicle Operations on an Airport" (DOT/FAA/AS-90-3). A copy of this document is attached at the end of this specification.

THE AIRPORT AND/OR THE FAA MAY HAVE ADDITIONAL REQUIREMENTS FOR VEHICLES, EQUIPMENT, AND PERSONNEL OPERATING INSIDE THE AOA.

#### **3.4.2.4 Unauthorized Structures**

The contractor shall install no fences or other physical obstructions on or around the project work area without the approval of FAA Project Engineer.

#### **3.4.2.5 Hazard Marking**

The contractor shall use barricades, flashers, flags, traffic cones, signs, etc., for the following:

- To prevent aircraft from taxiing onto a closed runway, taxiway or apron.
- To outline construction/maintenance areas.
- To identify isolated hazard areas such as open manholes, ditches, potholes, waste areas, etc.
- To identify FAA and Airport facilities, cables, power lines, ILS Critical areas, and other sensitive areas, in order to prevent damage, interference and facility shutdown.

All hazard markings shall be furnished and setup by the contractor. Barricades inside the runway safety area shall be lightweight and frangible. For daytime use, barricades should be supplemented by flags; for night time use, they shall have flashing yellow lights. Night time barricades shall not penetrate the approach surface. All markings shall be to the approval of the FAA Project Engineer.

#### **3.4.2.6 Safety Plan**

Prior to commencement of work, the contractor shall submit a safety plan for approval by the Project Engineer. An acceptable safety plan shall take into account areas discussed in Appendix 1 of AC 150/5370-2C and the Airport's rules for construction activity at the Airport.

#### **3.4.3 Radio Communications**

The contractor's superintendent (or someone appointed by the superintendent) shall be required to monitor a transceiver radio at all times when the contractor is operating inside the runway safety area. The transceiver shall be contractor furnished with a frequency range of 118-136 Mhz and tuned to the local ATCT Tower or Ground Control (CTAF when tower is closed) frequency, UNICOM frequency, or as required. Such radios shall be used so that any unusual occurrence of approaching, departing, taxiing aircraft can be acknowledged by all concerned parties. The contractor's use of the transceiver radio is basically for listening purposes, transmitting should be in emergencies only.

#### **3.4.4 Work Limitations**

The contractor's activities shall be planned and scheduled to minimize disruption of normal aircraft activities. If the clearances and restrictions described in this section cannot be maintained while construction is underway (for example, when performing work that is required inside the runway safety area), action shall be taken to close runways (or taxiways, or aprons), displace/relocate the runway threshold temporarily (see 3.4.4.2), and/or to perform work at night or during periods of minimal aircraft activity, as approved.

##### **3.4.4.1 Trenches, Holes, and Excavations**

Trenches, holes, and any other type of excavation within the runway safety area are not allowed without either closing the runway or adequately displacing/relocating the runway threshold to accommodate the work. If a runway closure or displacement/relocation of the runway threshold becomes necessary, the contractor shall submit a detailed plan which must be approved by the Airport and the FAA.

#### **3.4.5 Work Plan**

Prior to commencement of work, the contractor shall submit a work plan for approval by the Project Engineer (see 1.4). An acceptable work plan shall take into account all areas discussed in this section.

### **3.5 PROTECTION OF EXISTING UTILITIES AND CABLES**

The existing utility lines, utility structures and all underground cables, as may be shown on the drawings are approximate and incomplete. Where excavation occurs in the vicinity of existing utilities or cables, the contractor shall use whatever means necessary, including a private cable locator, to locate the existing utilities or cables prior to any excavation. The contractor shall stake all utility or cable crossings and such areas shall be hand excavated. The contractor shall immediately repair any damage done by the contractor or suppliers to utilities or cable within the work area.

### **3.6 INSTALLATION AND WORKMANSHIP**

All work shall be performed according to the intent of the contract, and normal and accepted industry and Government standards.

All work shall be accomplished by skilled workers regularly engaged in this type of work. Where required by local regulations, the workers shall be properly licensed. Electrical terminations and splices shall be done by a qualified electrician.

The contractor shall give constant attention to the work to facilitate the progress thereof, and shall cooperate with the Project/Resident Engineer in every way possible. The contractor shall have a competent superintendent on the work site at all times who is fully capable of reading and thoroughly understanding the plans and specifications and shall receive and fulfill instructions from the Project/Resident Engineer.

An initial inspection shall be conducted when a representative sample of work has been completed. This work shall be approved by the FAA Project Engineer or his representative, prior to the commencement of additional work.

All conduits shall be completely cleaned prior to installing cable. A flexible mandrel shall be used to clean out mud, dirt, and debris from the raceways.

Underground conduits shall be installed so that no water can be trapped in the raceway (water must be able to drain out of one end).

All foundations, manholes, vaults, pull boxes, equipment racks, buildings, roads, retaining walls and other above ground structures shall be installed square (perpendicular and parallel) to the runway centerline, prevailing structure or road as indicated on the drawings unless specifically indicated to be otherwise. Elevated conduits and structures (those extending above grade) shall be installed level and plumb. Unless otherwise indicated, maximum tolerance for vertical plumbness is  $\frac{1}{8}$ " horizontal for every four feet vertical. Exposed raceways shall be installed parallel to or at right angles with the lines of the finished structure, unless otherwise indicated.

Tops of foundations, cans, pull boxes, manholes, vaults, etc., shall be uniform with the tops of concrete at the surrounding structures, natural grade or as indicated on the drawings or as directed by the Project Engineer. Unless otherwise indicated, top of foundations, cans, pull boxes, manholes, etc. shall be level with a maximum tolerance of  $\frac{1}{16}$ " per foot.

Road curves shall be as indicated on the drawings or as indicated by the Project Engineer. Edges of roads, walkways and graveled areas shall be clean, sharp, and well defined. Installed surface material shall not be allowed to spill outside the defined edges.

Installed foundations, structures, walkways, and roads not meeting the above requirements shall be removed, disposed of, and re-installed correctly at the contractor's expense.

### **3.7 TEMPORARY FACILITIES**

The contractor shall provide and pay for all temporary services and facilities as specified below and as necessary for the proper and expeditious execution of the work. The contractor shall make, or have made, all connections to existing services and sources of supply as necessary and/or indicated and pay all charges for same. All work under this Section shall comply with applicable laws, rules, regulations, codes, ordinances, and orders of all Federal, State, and Local authorities having jurisdiction for the safety of persons, materials and property. The contractor shall remove all such temporary installations and connections when no longer necessary for the project work.

#### **3.7.1 Temporary Water**

The contractor shall make arrangements to furnish a potable water supply for workers and project work, and pay for all water and services.

#### **3.7.2 Temporary Toilets and Sanitation**

The contractor shall provide ample and suitable on site sanitary conveniences with proper enclosures for the use by the workers, FAA personnel, and FAA support personnel. Such conveniences shall be kept clean, properly ventilated and installed and maintained in conformity with requirements of all laws and ordinances governing such installations. Locations shall be

subject to the FAA Project Engineer's approval. After completion of the work such conveniences shall be removed from the site.

### **3.8 SECURITY REQUIREMENTS**

The contractor shall comply with all security requirements established by the Airport and is responsible for any badging requirements. Only direct construction support personnel, vehicles and/or equipment will be allowed to the construction site.

During construction operations, the contractor shall use only the access gates and haul roads that are designated by the FAA Project Engineer and shown on the contract drawings. The contractor shall be required to keep access gates guarded and closed during construction hours. The gate may be opened only for authorized vehicle traffic flow. At such times as this gate is not guarded, it shall be closed and securely locked. The contractor shall be held duly responsible to uphold the above security stipulations at all times during the progress of the construction project. No deviations from these security measures shall be allowed at any time.

### **3.9 SAFETY**

All work shall be accomplished in accordance with OSHA Regulations (Standards – 29 CFR), Part 1926, Safety and Health Regulations for Construction.

Protective Equipment, including personal protective equipment for eyes, face, head, feet and protective clothing shall be used wherever it is necessary by reasons of hazards or environment [1926.95].

- Head protective equipment (helmets) shall be worn in areas where there is a possible danger of head injuries from impact, flying or falling objects, or electrical shock and burns [1926.100].
- Eye and face protection equipment shall be worn when machines or operations present potential eye or face injury [1926.102].

Specific work and operations requiring the mandatory use of personnel protective equipment shall be determined by the FAA Project Engineer.

### **3.10 SEDIMENTATION, EROSION, AND DUST CONTROL**

The Contractor shall submit a plan for sedimentation, erosion, and dust control. The plan shall show best management practices such as the use of silt fencing and/or hay bales to filter sediments from runoff and the application of water as needed to control dust.

### **3.11 DEBRIS CONTROL AND CLEAN-UP**

The work site shall be kept clean and orderly during the progress of work. Special attention shall be exercised to prevent the production of FOD (foreign object debris) which could cause damage to aircraft and/or airport equipment. Prior to the Contract Final Inspection, the contractor shall clean all areas of the construction site. This shall include but is not limited to the dress-up, sweep-up, and re-seeding of all areas disturbed during construction. A NEAT FINAL APPEARANCE OF THE INSTALLED FACILITIES (INTERIOR AND EXTERNAL) SHALL BE EMPHASIZED! All clean-up work shall be to the approval of the FAA Project Engineer.

Upon completion of work, the contractor shall be required to obtain a letter from the Airport Manager indicating that the work area has been left in an acceptable condition. A copy of the letter shall be given to the FAA Project Engineer.

### 3.12 INSPECTION & ACCEPTANCE

The Contractor shall maintain an adequate inspection system and perform such inspections to ensure that the work performed under the contract conforms to contract requirements. The Contractor shall maintain complete inspection records and make them available to the Government.

THE PRESENCE OR ABSENCE OF A GOVERNMENT INSPECTOR DOES NOT RELIEVE THE CONTRACTOR FROM ANY CONTRACT REQUIREMENT.

The Government inspections and tests are for the sole benefit of the Government and do not-

- Relieve the Contractor of responsibility for providing adequate quality control measures;
- Relieve the Contractor of responsibility for damage to or loss of the material before acceptance;
- Constitute or imply acceptance.

The Contractor shall, without charge, replace or correct work found by the Government not to conform to contract requirements. The Contractor shall promptly segregate and remove rejected material from the premises.

END OF SECTION



## **SECTION 02100**

### **SITE PREPARATION**

#### **PART 1 GENERAL**

##### **1.1 GENERAL**

The contractor shall provide the labor, equipment and materials to clear and grub the site of all brush, trees, stumps, and other materials as specified herein.

#### **PART 2 PRODUCTS**

Not Used

#### **PART 3 EXECUTION**

##### **3.1 SITE BOUNDARIES**

The Contractor will locate all structures and access roads by establishing line and grade in the vicinity of each structure. The contractor shall verify established control points, perform any additional surveys and maintain control points as required to ensure the accuracy of the work.

##### **3.2 GRUBBING**

Grubbing shall consist of the removal and disposal of stumps, roots larger than 1-1/2 inches in diameter, matted roots, and subsurface piping, where indicated, from the designated grubbing areas. This material, together with logs and other organic or metallic debris not suitable for foundation purposes shall be excavated and removed to a depth of not less than 18 inches below the final ground elevation in areas indicated to be grubbed and in areas indicated as construction areas for access roads or walkways. Depressions made by grubbing shall be filled with suitable material and compacted such that the finished surface shall match the adjacent surface in composition, degree of compaction, and elevation.

##### **3.3 DISPOSAL OF CLEARED MATERIALS**

All brush, and other refuse from the clearing operations shall be removed from site and disposed of at the contractor's expense and at no extra cost to the Government. Disposal of material shall not be permitted on airport property.

END OF SECTION

## **SECTION 02200**

### **EARTHWORK**

#### **PART 1 GENERAL**

##### **1.1 GENERAL**

The contractor shall perform and complete all work as necessary for excavation, filling, backfilling, and grading required on the applicable drawings and specified herein.

##### **1.2 REFERENCES**

The latest edition in effect of the following publications form a part of this specification and are applicable to the extent specified herein.

###### **1.2.1 American Association of State Highway and Transportation Officials (AASHTO)**

AASHTO-T99Moisture-Density Relations of Soils

AASHTO-T191 Field Determination of Density of Soil in Place, Sand Cone Method

AASHTO-T204 Field Determination of Density of Soil in Place, Dry Cylinder Method

AASHTO-T205 Field Determination of Density of Soil in Place, Rubber Balloon Method

AASHTO-T233 Field Determination of Density of Soil in Place, Block, Chunk or Core

###### **1.2.2 American Society for Testing and Materials (ASTM) Standard**

ASTM D-424 Test for Plastic Limit and Plastic Index of Soils

#### **PART 2 PRODUCTS**

Not Used

#### **PART 3 EXECUTION**

##### **3.1 EXCAVATION**

###### **3.1.1 Classification**

All material excavated is unclassified and can be accomplished by trencher or backhoe and will not require ripping or blasting.

### **3.1.2 Drainage**

Excavation shall be performed so that the area of the site and the area immediately surrounding the site and affecting operations at the site will be continually and effectively drained. Water shall not be permitted to accumulate in the excavation. The excavation shall be drained by pumping or other satisfactory methods to prevent softening of the foundation bottom, undercutting of footings, or other actions detrimental to proper construction procedures.

### **3.1.3 Freezing**

When freezing weather is expected, excavations shall not be made to the full depth, unless the footing concrete can be placed immediately. If excavation is already at full depth, the excavation shall be protected from frost.

### **3.1.4 Excavation for Slabs and Footings**

The excavations shall conform to the dimensions and elevations of the drawings applicable to footings and other foundation structures which are cast in place.

#### **3.1.4.1 Limits**

Excavations below indicated depths shall not be permitted except to remove material consisting of shale, sod, clods, stones larger than 4 inches, organic debris, trash or frozen material. Such unsatisfactory material shall be removed to a depth of 6 inches and replaced with satisfactory fill material. Unauthorized over excavation for footings shall be replaced at no additional cost to the Government to the indicated excavation grade with concrete. Excavation shall extend a sufficient distance from footings to allow for placing and removal of forms, installation of services, and for inspection, except where the concrete for walls and footings is authorized by the Resident Engineer to be deposited directly against excavated rock surfaces.

### **3.1.5 Trench Excavation**

Trenches for direct earth burial cables, conduits and other utilities shall conform to the dimensions and elevations shown on the applicable drawings. The banks need not be kept vertical but may be sloped or widened to such general limits as may be set by the Resident Engineer, provided there is no interference with other utilities. The trench bottom shall be a minimum of 6 inches wide or as required to provide separation between power and control cables or between power cables of different voltages. The trench depth shall be deep enough to allow cable placement plus an over excavation of at least three inches. The over excavation shall be filled with earth or sand containing no material aggregate particles that would be retained on a 1/4-inch sieve. The fill material shall be compacted to approximately the same density of the adjacent soil.

### **3.1.6 Excavation for Walkways and Access Roads**

The excavation shall conform to the dimensions and elevations of the drawings applicable to areas designed for vehicular and pedestrian traffic. Subgrade areas for access roads and walkways shall be plowed, disked and moistened or aerated as required obtain proper compaction. Muck, peat and other unsatisfactory material shall be removed to a minimum depth of 12 inches below excavation grade or as required to provide a satisfactory foundation. Low areas resulting from removal of such material shall be brought up to required grade with satisfactory fill material.

### **3.1.7 Excavation of Ditches, Swales and Culverts**

Ditches, swales and culverts shall be cut accurately to the cross sections and grades indicated. The sides and bottom of ditches and swales shall conform to the slope, grade, and shape of the section indicated. Care shall be taken not to excavate ditches and swales below the grades indicated. Excessive excavation shall be backfilled to the indicated excavation depth with approved material and compacted to 90 percent maximum density. All ditches, swales, and culverts excavated under this section shall be maintained until final acceptance of the work.

### **3.1.8 Safety and Protection of Work**

Sheeting and shoring shall be done as may be necessary for the protection of the work and for the safety of personnel. The manner of bracing excavations shall comply with local regulations and OSHA construction regulations. Grading shall be performed in a manner to ensure proper drainage at all times.

### **3.1.9 Utilization of Excavated Materials**

Satisfactory excavated material shall be used in the work insofar as practicable. No excavated material shall be disposed of in such a manner as to obstruct the flow of any stream, endanger a partly finished structure, impair the efficiency or appearance of any structure, or be detrimental to the completed work in any way.

### **3.1.10 Inspection of Excavated Area**

When excavations have reached the required elevations, the contractor shall not proceed with further construction of the excavated area until the area has been inspected by the Resident Engineer.

## **3.2 FILL AND BACKFILL**

### **3.2.1 Weather Conditions**

No fill or backfill operations shall be performed when weather conditions are determined by the Resident Engineer to be too wet or cold to permit such operations.

### **3.2.2 Satisfactory Material**

Material suitable for fill, backfill and embankment purposes shall be reasonably free of shale, sod, clods, and stones larger than 4 inches, organic debris, trash and frozen material. Only materials suitable for obtaining the degree of compaction specified herein shall be used.

### **3.2.3 Preparation of Surface for Fill and Embankment**

All surfaces designated to receive fill and embankment material shall be inspected prior to material placement. Soil surfaces on which compacted fill is to be placed shall be plowed, disked or otherwise broken up to a depth of 6 inches, pulverized, moistened or aerated as necessary, mixed and compacted to the same density as required for the fill or embankment material. Sloped ground surfaces steeper than one vertical to four horizontal on which fill is to be placed shall be stepped or benched, as directed, in such manner that the fill material will bond with the existing surface. The finished surface shall be reasonably smooth, compacted and free from irregular surface changes. The degree of finish shall be that ordinarily obtained from blade-grader operations or, where more suitable, hand raking.

### **3.2.4 Source of Fill Material**

Fill material shall be selected for the particular fill area for which it is to be used. Fill material shall not be confused with surfacing aggregate. Necessary clearing, grubbing, and disposal of debris, shall be considered incidental operations to the borrow excavation and shall be performed by the contractor. All material stockpiled on site shall either be used as fill material or disposed of by the contractor.

### **3.2.5 Fill for Slabs and Foundations**

Satisfactory material shall be placed in horizontal layers of 6 inches (loose measurement) and compacted to 95 percent maximum density. Unless directed by the Resident Engineer, no backfill shall be placed against footings prior to 7 days after footings and slabs are poured.

### **3.2.6 Backfilling of Conduit Trenches**

Trenches shall be backfilled as indicated on the drawings. Unless otherwise indicated, backfilling of the conduit trenches shall be done as follows:

- Place 4 inches of sand in the base of the trench.
- Place clean conduits on top of the sand base. Use conduit spacers (or other approved method) to maintain the required horizontal and vertical separation between conduits.
- Place sand to a level of 12 inches above the top of the conduits.
- TAMP sand.
- Place guard wire and warning tape.

- Place approximately 14" of select fill above sand (select fill shall contain no particles that would be retained on a 1 inch sieve).
- TAMP and COMPACT select fill to a minimum of 90% of maximum density in accordance with AASHTO-T-99. Compacted depth should be approximately 12" above sand.
- Place approximate 14" more of select fill.
- TAMP and COMPACT again to a minimum of 90% of maximum density.
- Place the remaining amount of select fill required and COMPACT and TAMP a third time. The finished level of the top of the trench shall not exceed 2 inches above the surrounding grade.

The disturbed area shall be cleaned, raked, and seeded. All trench backfilling shall be to the approval of the Airport Manager and the Project Engineer. THE CONTRACTOR SHALL GUARANTEE THAT NO SETTLEMENT OCCURS WHICH LEAVES A DEPRESSION BELOW THE SURROUNDING GRADE FOR A PERIOD OF ONE YEAR AFTER PROJECT COMPLETION.

### **3.2.7 Fill and Embankment for Access Roads, Walkways, and Culverts**

Fills and embankments shall be constructed at the locations and to lines and grades indicated on the drawings. The material shall be placed in successive horizontal layers of 8 inches, loose measure, for the full width of the cross section. Fills and embankments shall be compacted to 95 percent of maximum density. Final elevations after compaction shall not vary more than 0.05 feet from the established grade and approved cross section.

### **3.2.8 Fill for Open Areas**

All open areas to receive seed or sod shall be filled to within 6 inches of final grade with satisfactory material. Fill beneath this layer shall consist of material free of rocks larger than 6 inches and shall be placed in layers not greater than 8 inches, loose measure. All layers shall be compacted to 90 percent maximum density.

### **3.2.9 Placing of Crushed Rock and Topsoil**

On areas to receive crushed rock or topsoil material, the compacted fill or subgrade shall be scarified to a depth of 2 inches. Material to be placed shall then be evenly spread, graded and compacted to 90 percent of maximum density. Material required to be placed within two feet of footings or slabs shall be compacted by approved hand tampers. Compaction of topsoil to be grassed or sodded may be deferred until after seeding or sodding operations.

### **3.2.10 Compaction Methods**

Compaction shall be performed using the method and equipment suitable for the area as specified. Mechanical hand tampers shall be used only in areas adjacent to footings and slabs or in trenches or other areas where use of rollers is not practical. Compaction with pneumatic-tired

rollers, three wheel power rollers, sheepsfoot rollers, etc., shall be used in all other areas as required to provide the specified compaction density.

#### **3.2.11 Determination of Density**

Maximum density tests will be performed in accordance with AASHTO-T99 and field density tests will be performed in accordance with AASHTO-T191, T204, T205, or T233.

END OF SECTION

## **SECTION 02930**

### **SEEDING**

#### **PART 1 GENERAL**

##### **1.1 GENERAL**

All seeded areas disturbed by the contractor shall be restored to its original condition. The work covered by this section consists of furnishing all labor, materials, tools, equipment, plant and services necessary to complete the portion of site work including topsoil placement, sodding and planting specified herein and as shown on the applicable drawings.

#### **PART 2 PRODUCTS**

##### **2.1 FERTILIZER**

A commercial fertilizer, uniform in composition, free flowing and suitable for spreading with approved equipment shall be used. Fertilizer shall be not less than 40 pounds nitrogen and 40 pounds phosphorus per acre.

##### **2.2 SEED**

New seed shall be applied so that the resulting growth results in a turf that matches the undisturbed surrounding areas. The exact seeding mixture shall be obtained from and approved by the Airport.

#### **PART 3 EXECUTION**

##### **3.1 PREPARATION OF GROUND & SEEDING**

Areas to be seeded shall be raked or otherwise cleared of stones larger than 3" in diameter, sticks, and other debris which might interfere with sowing of seed and growth of grasses. Following preparation, fertilizer shall be uniformly spread over the entire area to be seeded. Immediately after fertilizing the seed shall be sown at the specified rate and the seed shall be raked in 1/2 to 3/4 inch.

##### **3.2 MAINTENANCE AND REPAIR**

The contractor shall maintain seeded and sodded areas until the Contractor Acceptance Inspection. Maintenance shall consist of watering and mowing operations and protecting such areas from traffic. Repair shall consist of reestablishing seed or sod areas damaged by traffic, erosion, drought, fire, or water. Such areas shall be re-sodded or re-seeded in accordance with this specification or as directed by the Resident Engineer until a satisfactory growth is obtained.

END OF SECTION



## **SECTION 03100**

### **CONCRETE FORMWORK**

#### **PART 1 GENERAL**

##### **1.1 GENERAL**

The contractor shall provide all labor, equipment and materials as required to locate and place concrete forms specified herein or on applicable drawings.

#### **PART 2 PRODUCTS**

##### **2.1 FORMS**

Forms shall be wood, plywood, metal or other approved material. The contractor may use prefabricated forms for cylindrical foundations if indicated on the applicable drawings. All form materials shall be of the grade or type suitable to obtain the kind of finish specified.

##### **2.2 CYLINDRICAL CONCRETE PIERS**

All cylindrical concrete piers, if required, shall be formed to a depth of two feet minimum. Use approved cylindrical forms.

##### **2.3 FORM TIES**

Form ties shall be either fixed band type or threaded internal disconnecting type with a working load suitable to prevent deformation of forms. They shall be of the type as to leave no metal closer to the surface than 1/2 inches for steel ties and 1 inch for stainless steel ties. Twisted wire ties shall not be permitted.

##### **2.4 FORM OIL**

Form oil shall be nonstaining and shall not cause softening of the concrete or impede the wetting of surfaces to be cured with water or curing compounds.

#### **PART 3 EXECUTION**

##### **3.1 FORMWORK PLACEMENT**

Formwork shall not be placed prior to inspection, testing or approval of the excavated area and imbedded items by the Resident Engineer. Forms shall result in a final structure which does not exceed +1/2 inch variation in any dimension shown on the applicable drawings. Form joints shall be sufficiently tight to prevent leakage of mortar. Form oils shall be placed on forms or form ties and shall be removed from reinforcing steel or conduits if accidentally applied to such.

### **3.2 FORM CURING**

In hot, dry climates, wood forms remaining in place shall not be considered adequate curing, but shall be loosened so that the concrete surfaces may be cured in accordance with 3-3.6.

### **3.3 FORM REMOVAL**

Forms shall not be removed until concrete has attained at least 30 percent of the specified 28-day compressive strength.

END OF SECTION

## **SECTION 03200**

### **CONCRETE REINFORCEMENT**

#### **PART 1 GENERAL**

##### **1.1 GENERAL**

The contractor shall provide the necessary labor, materials and equipment for the placement of steel reinforcement as specified herein and shown on the applicable drawings.

##### **1.2 REFERENCES**

The following specifications and standards of the issues currently in force, form a part of this section and are applicable as specified herein.

###### **1.2.1 American Society for Testing and Materials (ASTM)**

ASTM A 615 - Deformed Billets Steel Bars for Conc. Reinforcement

ASTM A 185 - Welded Wire Fabric for Concrete Reinforcement

###### **1.2.2 American Concrete Institute (ACI) Standards**

ACI 315 - Manual of Engineering and Placing Drawings for Reinforced Concrete Structures

#### **PART 2 PRODUCTS**

##### **2.1 REINFORCING STEEL**

Reinforcing steel shall be new, clean, undamaged, and unless otherwise indicated, conforming to ASTM A-615, grade 60.

##### **2.2 TIE WIRE, CHAIRS, AND SPACERS**

All devices necessary to properly space, support and fasten steel reinforcement in place during concrete placement shall conform to ACI 315. Tie wire shall be 16 gauge or larger annealed iron wire.

#### **PART 3 EXECUTION**

##### **3.1 REINFORCEMENT SURFACES**

Steel reinforcement shall be free of mud, oil or other nonmetallic coatings which may affect bonding quality. Mill scale or rust remaining after hand brushing with a wire brush is permissible.

### **3.2 BENDING**

All bends in bars and ties shall be cold bent. No bends shall be made in bars or ties partially embedded in concrete.

### **3.3 HOOKS**

Hooks indicated shall be 180 degree hooks. The bend diameter as measured on the inside of the bar shall be not less than 6 bar diameters for bars and not less than 1-1/2 inches for #3 ties.

### **3.4 PLACING REINFORCEMENT**

Steel reinforcement shall be accurately placed at the spacing and in the sizes indicated on the applicable drawings and secured against displacement during the pour operations. Reinforcement shall be placed within +1/2 inch of the indicated dimensions.

### **3.5 QUALITY ASSURANCE**

Two copies of mill certificates of steel compliance with ASTM A 615 shall be submitted to the Resident Engineer at the time of site delivery. The certificate shall be signed by an authorized officer of the contractor, and shall include the project name and location, and the quantity and delivery date to which the certificate applies.

END OF SECTION

## **SECTION 03300**

### **CAST-IN-PLACE CONCRETE**

#### **PART 1 GENERAL**

##### **1.1 GENERAL**

The contractor shall provide the necessary materials, labor and equipment for the placement of concrete as specified herein and shown on applicable drawings.

##### **1.2 REFERENCES**

The following specifications and standards of the issues currently in force, form a part of this section and are applicable as specified herein.

##### **1.2.1 American Society for Testing and Materials (ASTM) Specifications**

ASTM C 33 Specifications for Concrete Aggregates  
ASTM C 94 Specifications for Ready-Mixed Concrete  
ASTM C 143 Slump of Portland Cement Concrete  
ASTM C 150 Specification for Portland Cement  
ASTM C 231 Air Content of Freshly Mixed Concrete by the Pressure Method  
ASTM C 260 Specification for Air-Entraining Admixtures for Concrete  
ASTM C 494 Specification for Chemical Admixtures for Concrete

##### **1.2.2 American Concrete Institute (ACI) Specification**

ACI 211.1 - Recommended Practice for Selecting Proportions for Normal and Heavyweight Concrete

##### **1.3 SUBMITTALS**

Provide certification signed by material producer and contractor that all materials and mix compositions comply with the specified requirements.

#### **PART 2 PRODUCTS**

##### **2.1 CEMENT**

All cement shall conform to ASTM C 150, Type I or Type III as indicated on the drawings.

##### **2.2 AGGREGATES**

Aggregate shall conform to ASTM C 33 except that maximum aggregate size shall be 3/4-inch.

## **2.3 WATER**

Water used in mixing and curing operations shall be clean, and free from oils, acids, organic matter and chemical suspensions which may adversely affect cure times, strength requirements or service life of the concrete.

## **2.4 ADMIXTURES**

Air entraining admixtures shall conform to ASTM C 260. Admixtures used for water-reducing and retarding shall conform to ASTM C 494, Type A or Type D.

## **2.5 QUALITY**

### **2.5.1 Slump**

The concrete shall have a slump of 3 to 4 inches.

### **2.5.2 Strength**

Unless otherwise indicated on the construction drawings, Type I concrete shall have a 28 day compressive strength of 3,000 psi and Type III shall have a 7 day compressive strength of 3,000 psi.

### **2.5.3 Air Content**

Air entraining for all concrete shall be 4 to 8 percent.

### **2.5.4 Proportions**

Concrete materials shall be proportioned in accordance with ACI 211.1 for site mixed concrete and ASTM C 94 for ready mixed concrete.

## **2.6 EXPANSION JOINT FILLER**

Use flexible foam expansion joint filler for example, Ceramar by W.R. Meadows, Inc. Product shall meet the requirements of ASTM D 1752, Sections 5.1 through 5.4 with the compression requirement modified to 10 psi minimum and 25 psi maximum and shall be compatible with hot-pour joint sealers.

## **2.7 EXPANSION JOINT SEALANT**

Use one-part self-leveling polyurethane sealant such as Sonolastic SL1 by Sonneborn (or approved equal). Product shall comply with Federal Specification TT-S-00230C, Type 1 Class A; ASTM C 920, Type S, Grade P, Class 25, Use T, M.

## **PART 3      EXECUTION**

### **3.1 MIXING AND PLACING CONCRETE**

#### **3.1.1 Site Preparation**

Prior to placing concrete all areas to receive concrete shall be inspected and approved by the Resident Engineer. Concrete shall not be deposited on muddy or frozen material. All surfaces to be in contact with the concrete shall be wetted.

#### **3.1.2 Mixing**

All mixers used for ready mix or site mix operations shall be cleaned prior to material recharge. The area of operation of the mixers shall be such as to not endanger existing structures or excavations. All concrete shall be mixed until there is a uniform distribution of materials. Concrete having attained initial set or having contained water for more than 90 minutes shall not be used in the work.

#### **3.1.3 Conveying**

Concrete shall be conveyed from the mixer to the deposit site by equipment which will prevent separation or loss of material and which will ensure a nearly continuous flow of material at the deposit site.

#### **3.1.4 Depositing**

Concrete shall be placed in such a manner as to prevent displacement of forms or reinforcement. Placing shall be stopped if contamination due to sloughing occurs until the contaminant can be removed. In the case of form or reinforcement displacement, placing may be continued only if the displacement is corrected within specified tolerances. The placing of concrete shall be a continuous operation at each deposit site and shall be completed within 1-1/2 hours after the addition of water. Concrete shall be deposited in 12 to 18 inch layers as level as possible prior to consolidation operations. Under no circumstances shall fresh concrete be placed over concrete that is no longer plastic. Time between placements at each deposit site shall not exceed one hour for regular mixes and two hours for retarded mixes.

#### **3.1.5 Cylindrical Concrete Piers**

Tops of piers shall be furnished flat within the confines of the Sonotube forms. Unless otherwise approved, the edges shall have a 1/2" or 3/4" radius. No spillage (mushrooming) over the tops of forms will be allowed.

#### **3.1.6 Consolidation**

Consolidation of concrete during and after placing shall be performed using an internal vibrator with a vibration frequency not less than 150 hertz. Each layer shall be consolidated so that

concrete is thoroughly worked around reinforcement, embedded items and forms. Vibrators shall penetrate about 6 inches into underlying layers to ensure proper union of the layers. Movement of the vibrator over the layer shall be such as to ensure uniform plasticity without pooling of cement.

### **3.1.7 Finish**

After the concrete has been placed and consolidated, the surface shall be screed with straight edges, floated, and troweled to the required finish level. All concrete surfaces shall have a smooth finish except for exposed top surfaces which shall have a broom finish. Broom lines shall be straight and parallel to the form edges and well defined. Unless otherwise indicated on the drawings, the foundation surface shall be level +/- 1/8" and all exposed edges shall be chamfered 1 inch (1/2" or 3/4" radius on circular tops). A NEAT, CLEAN, PROFESSIONAL CONCRETE FINISH IS REQUIRED! Concrete not meeting this requirement shall be completely removed and replaced at the contractor's expense.

Apply a Concrete Curing Compound (SealMaster or as approved) as directed by the manufacturer and as approved. Concrete Curing Compound should generally be applied once the concrete is firm enough to walk on with no surface water present (about one hour after final trowelling or when application will not mar surface).

## **3.2 CURING**

Concrete shall be maintained above 50 degrees F and less than 120 degrees F and in a moist condition during the cure period. The cure period shall be 7 days when Type I Portland cement is used and 3 days when Type III Portland cement is used. Exposed surfaces shall be covered with burlap, cotton, or other approved fabric or sand. If air temperatures are expected to exceed 75 degrees F, water curing shall be continuous and forms shall be loosened as soon as the concrete has set sufficiently to prevent damage. In conditions where air temperature may be expected to fall below 40 degrees F, equipment and covering to maintain a 50 degree concrete temperature shall be provided. Salt or other chemicals to prevent freezing shall not be permitted.

## **3.3 ANCHOR BOLTS, PLATES, AND COUPLINGS**

### **3.3.1 Anchor Bolts and Plates**

Anchor bolts shall be installed in concrete prior to the concrete setting and at a time and manner to assure that there is no voids around the bolts. Anchor bolts and plates shall be set level and plumb, and within a tolerance necessary for their proper alignment and to the structure support. Flanges and anchors shall be set level and plumb, and within a tolerance necessary for their proper alignment and to the frangible structure they support. All bolts and other hardware shall be hot-dipped galvanized and shall be contractor furnished (unless otherwise indicated to be government furnished).

### **3.3.2 Embedded Couplings**



Couplings embedded in concrete shall be installed so that the top of the coupling is flush with the top of concrete and conduits to be extended from the coupling are level and plumb. Foundations with embedded couplings that do not meet this requirement shall be removed and re-installed at the contractors expense.

### **3.4 QUALITY ASSURANCE**

#### **3.4.1 Testing**

Testing for the concrete shall be arranged by the contractor and performed by an independent testing company (in the presence of the Resident Engineer) at the expense of the contractor. If these tests show concrete strength less than specified, the contractor shall correct the situation and be responsible for all associated cost.

#### **3.4.2 Certification**

The contractor shall furnish a certificate that all materials, compositions, densities and mixtures to be used meet local or state requirements. The contractor shall provide the Resident Engineer with a delivery ticket (batch ticket) for ready mix concrete from the concrete supplier at the time of each delivery which certifies compliance with material and quality requirements specified herein. The tickets shall indicate the delivery date, time dispatched, name and location of project, name of contractor, name of concrete producer, truck number, quantity, air content, admixtures and design strength of the concrete delivered.

### **3.5 REPAIR OR REPLACEMENT**

The contractor shall restore concrete damaged by work under this contract to its original condition as directed by the Resident Engineer. The Resident Engineer shall reject any fresh concrete not meeting slump or air entrainment requirements. Any concrete not meeting strength requirements shall be removed and replaced by the contractor. Any repair or replacement costs shall be paid by the contractor.

END OF SECTION

## ***DIVISION 16000***

### ***ELECTRICAL***

#### **PART 1 GENERAL**

##### **1.1 GENERAL**

This section covers the requirements for electrical work complete. The work covered under this section consists of furnishing all labor, tools, equipment and material to install the electrical work shown on the drawings and/or described by these specifications.

###### **1.1.1 Workmanship**

All electrical installation work shall be performed by experienced electricians regularly engaged in this type of work and properly licensed when required. All materials and equipment shall be installed in conformance with the contract documents, and in accordance with recommendations of the manufacturer as approved by the Resident Engineer.

###### **1.1.2 Interpretation of Drawings**

In general, the drawings utilize accepted diagrammatic symbolism to indicate electrical construction work. This symbol does not have any dimensional significance. The layout of wiring, circuits, outlets, and equipment is developed as an engineering aid and should not be interpreted as a release from responsibility for installing the work without space conflict, but all work shall be installed in accordance with the diagrammatic intent of the drawings.

###### **1.1.3 Rules**

The installation shall conform to this specification, the contract drawings and to the applicable requirements of the National Electrical Code, local code, or FAA standards. In cases where regulations and/or contract documents are conflicting or discrepancies occur, the more stringent requirement shall be followed and enforced.

###### **1.1.4 Coordination**

It is the responsibility of the contractor to totally familiarize himself/herself with the scope of the work involved and to coordinate his work with the other trades and personnel involved with the job site.

##### **1.2 REFERENCES**

The issues currently in force of the following specifications and standards form a part of this section, and are applicable as specified herein:

### **1.2.1 National Fire Protection Association (NFPA) Publications**

No. 70          National Electrical Code

No. 78          Lightning Protection Code

### **1.2.2 FAA Specifications and Standards**

UNLESS OTHERWISE INDICATED, THE CONTRACTOR SHALL COMPLY WITH THE FOLLOWING FAA SPECIFICATIONS AND STANDARDS:

FAA-C-1217f          Electrical Work, Interior

FAA-C-1391b          Installation and Splicing of Underground Cables

FAA-STD-019e          Lightning and Surge Protection, Grounding, Bonding and Shielding Requirements for Facilities and Electronic Equipment.

### **PART 2          PRODUCTS**

Not Used

### **PART 3          EXECUTION**

CONTRACTORS SHALL IMMEDIATELY NOTIFY THE FAA OF ANY CONFLICTS THAT EXIST WITHIN THE CONTRACT DOCUMENTS AND BETWEEN THOSE DOCUMENTS AND THE RULES, REGULATIONS AND CODES OF THE LOCAL UTILITY COMPANY AND LOCAL COUNTY OR STATE GOVERNING BODIES. IN CASES WHERE REGULATIONS AND/OR CONTRACT DOCUMENTS ARE CONFLICTING OR DISCREPANCIES OCCUR, THE MORE STRINGENT REQUIREMENT SHALL BE FOLLOWED AND ENFORCED.

## SECTION 16100

### ELECTRICAL WORK

#### PART 1 General

- 1.1 Scope of Work – This specification covers the electrical and grounding work that is required to support installation of a replacement RVR. The work includes exterior wiring, buried conduit, hand holes and the installation of the Government Furnished (GFM) RVR Equipment.
- 1.2 Specific Items of Work – The following is a list of items of electrical work required under this contract, it is not an all inclusive list and items not listed but necessary to complete the project shall be performed by the Contractor without additional compensation.
- A. Remove the existing RVR equipment, the concrete foundations and wiring.
  - B. Construct the conduit, hand hole and wiring for the RVR power and control.
  - C. Construct the RVR rack and install the VS/ALS SIE boxes on it.
  - D. Install the RLIM SIE box in the airport lighting vault.
- 1.3 Applicable Documents - The current issues of the following documents form a part of this specification.

#### FAA Standards and Specifications

FAA-C-1217f	Electrical Work Interior
FAA-STD-019e	Lightning and Surge Protection, Grounding, Bonding and Shielding Requirements for Facilities and Electronic Equipment
FAA-C-1391b	Installation and Splicing of Underground Cables

#### National Fire Protection Association (NFPA)

NFPA No. 70	National Electric Code
NFPA No. 780	Standard for the Installation of Lightning Protection Systems

- 1.4 Submittals – The Contractor shall provide a submittal for the items listed in spec section 01010 Paragraph 1.4.1.

## PART 2 Materials

- 2.1 General - Materials furnished by the Contractor shall be new, the standard products of manufacturer's regularly engaged in the production of such materials, and of the manufacturer's latest designs that comply with the specification requirements. All materials shall be UL listed and boxes shall comply with the specified NEMA rating.
- 2.2 Material Substitutions - The specific products of manufacturers are spelled out in several instances in this contract. It will be the responsibility of the Contractor to demonstrate that any product substitutions that are made do not affect the constructability or quality of the work.
- 2.3 Conduit – Minimum conduit size shall be 3/4 inch unless otherwise specified.
- A. Electric metallic tubing (EMT) – EMT shall conform to UL 797. EMT may be used only in dry interior locations, and where not subject to physical damage or where specifically shown. Fittings used with EMT shall be standard compression-type. Where EMT enters enclosures a threaded connector shall be used to bond the conduit to the enclosure. In addition the connectors shall have an insulated-throat bushing.
- B. Zinc coated rigid steel conduit (GRMC/GRS) - RSC shall conform to UL 6. RSC may be used in all locations and shall be used for all underground service conductors. For underground installation, the conduit shall conform to Steel Structures Painting Council Standard, SSPC-PS 10.01. Rigid steel conduits installed underground shall be field wrapped with 0.01 inch thick pipe wrapping plastic tape applied with a 50 percent overlap, or shall have a factory applied plastic resin. Fittings used underground shall be protected by field wrapping as specified herein for conduit. All fittings used with rigid steel conduit shall be the threaded type, the same material as the conduit. Conduit straps and Unistrut used to mount GRS conduit shall also be galvanized. Where conduits enter enclosures without threaded hubs, double locknuts (one on each side of the enclosure wall) shall be used to securely bond the conduit to the enclosure. In addition, a bushing shall be installed on the interior thread end of the conduit to protect conductor insulation.
- C. PVC conduit – Polyvinyl Chloride (PVC) conduit shall be schedule 40, heavy wall rigid plastic with fittings and accessories designed for direct earth burial, manufactured to NEMA TC-2 and Federal Specification WW-C-1094; UL listed. Exposed PVC conduit shall be sunlight resistant.
- 2.4 Conductors -
- A. Un-insulated Conductors – All un-insulated conductors shall be copper.
- B. Insulated Conductors - All power cable furnished for installation shall be soft drawn or annealed copper conductor with thermoplastic or thermosetting insulation, type THW, THWN, or XHHW for general use and type THHN for use

in dry areas only. Conductors No. 10 and smaller shall be solid and conductors No. 8 and larger shall be stranded. Minimum branch circuit conductor size shall be No. 12 AWG.

- 2.5 Receptacles – All receptacles shall be specification grade in accordance with NEMA STD WD-1 with screw-type terminals and rated for 20 amps and 125 volts. Receptacles with push-in connections or a combination of screw-type and push-in connections are not acceptable. Receptacle shall be provided with screw terminal for landing a grounding conductor.
- 2.6 Circuit Breakers – All circuit breakers shall be UL listed thermal magnetic type with a minimum rating of 10,000 AIC. Circuit breakers shall also have trip ratings, voltage ratings and number of poles as defined on the drawings. Circuit breakers shall meet the following requirements:
- A. Full Size – Only full size circuit breakers shall be used.
  - B. Manufacturer – panel boards and circuit breakers shall be products of the same manufacturer.
  - C. Thermal Magnetic – Thermal magnetic circuit breakers shall be quick make, quick break type conforming to Federal Specification W-C-375.
- 2.7 Warning Tapes - A plastic warning tape shall be continuous imprinted with the appropriate legend and shall be located 10 inches (max) below finished grade.
- 2.8 Earth Electrode System (counterpoise)/Lightning Protection System
- A. Grounding Conductor – shall be formed with #4/0 AWG bare copper conductor.
  - B. Ground Rods – ground rods shall be ¾ inch by 10 feet copper or copper clad steel.

### **PART 3 Execution**

- 3.1 General - The rules, regulations and reference specifications enumerated in section shall be considered as minimum requirements. FAA requirements often exceed those of other standards organizations such as NEC. Adherence to other standards shall not relieve the Contractor from furnishing and installing higher grades of materials and workmanship when so required by this specification or on the drawings.
- 3.2 Workmanship - All materials and equipment shall be installed in accordance with the contract drawings and manufacturer's installation instructions. The installation shall be accomplished by qualified workers regularly engaged in this type of work. All electrical work shall be performed by a licensed electrician.

- 3.3 Lockout/Tag Out – Electrical work shall not be performed on panel boards, switches and other devices when they electrical charged (hot). A lockout/tag out procedure shall be followed to make certain that electrical devices are deactivated. The contractor shall provide a written copy of the lockout/tag out procedure to the Resident Engineer before electrical work begins.
- 3.4 Outages – This facility is a functioning part of the National Air Space System that FAA Air Traffic Control uses to safely route commercial aircraft. Unplanned outages of this facility could cause a serious disruption of Air Traffic Control Services and put the flying public at risk. Even the shortest disruption of electrical service must be planned and coordinated in advance. The Contractor shall request electrical outages through the Resident Engineer who will request an outage from Air Traffic Control. It may be that the only time acceptable to Air Traffic Control is during late evening and very early morning hours.
- 3.5 Color Coding – Color coding shall be continuous throughout the facility on each phase conductor to its point of utilization. Equipment grounding conductors shall be color coded green. Phase conductors shall be color coded in compliance with the following table:
- |    |                     |                          |
|----|---------------------|--------------------------|
| A. | <u>Single Phase</u> |                          |
|    | <u>120 Volts</u>    | <u>120/208/240 Volts</u> |
|    | Line 1 – Black      | Line 1 – Black           |
|    | Neutral – White     | Line 2 – Red             |
|    |                     | Neutral – White          |
- 3.6 Circuit Numbering – All conductors, including neutral and ground conductors, shall be identified at both ends of the conductor with panel and circuit number indicated. Shrink embossed, circuit numbering labels shall be used. The Contractor shall provide an updated panel directory in panels where circuits are changed. The directory shall be typed on a panel directory specific to the brand of electrical panel.
- 3.7 Splices – Splices shall be made only at outlets, junction boxes or accessible raceways. Splices shall be made with solderless connectors conforming to UL 486A, UL 486C, and UL 486E. Insulated wire nuts may only be used to splice conductor sized No. 10 or smaller. Compression connectors shall be used to splice conductors No. 8 or larger. All splices shall be insulated with electrical tapes or shrink tubing.
- 3.8 Equipment Grounding Conductors – All metallic non-current carrying parts of electrical equipment shall be grounded with equipment grounding conductors. Equipment grounding conductors shall always be green insulated copper conductors. They shall be sized in accordance with Table 250-122 “Minimum Size Equipment Conductors for Grounding Raceway and Equipment” of the NEC, but not smaller than #12 AWG.

- 3.8.1 Installation of Equipment Grounding Conductors – Each over current device shall have its own equipment grounding conductor. The equipment grounding conductor shall be installed in the same conduit as its related branch and feeder conductors and shall be connected to the ground bus in the branch or distribution panel board. Metal conduit housing the equipment grounding conductor shall be electrically continuous, forming a parallel path to the grounding conductor.
- 3.9 Grounding - The grounding system for the facility shall be as shown on the drawings and as specified herein. The National Electrical Code, except where otherwise indicated herein, shall govern but in no case shall the Code be violated.
- 3.9.1 Grounding Electrode Conductor - The grounding electrode conductor shall be bare copper and sized as shown on the Project Drawings (#4/0 AWG minimum). The conductors and interconnecting grounding systems shall be sized in as shown on the project drawings. The grounding electrode conductor shall bond all grounding electrodes plus the neutral on the line side of the service disconnect.
- 3.9.2 Grounding Electrodes - Ground rods shall be copper clad steel, 3/4-inch diameter, minimum length 10 feet. Ground rods shall be driven vertically full length into the earth.
- 3.9.3 Grounding Connections - All equipment, armored cable, GRS conduit and all other exposed, non-current carrying metal parts of electrical equipment shall be grounded by an equipment grounding conductor sized in accordance with Table 250-95 of the NEC whether or not shown on the Project Drawings. This conductor must be run in the same raceway as the circuit conductors. All connection points shall be cleaned of paint, insulation and other non-conducting materials before making the connection. All connections to the equipment to be grounded shall be made with a ground connector specifically intended for that purpose. Connecting screws or mounting bolts are not suitable for use as grounding connections. Grounding conductors passing through conduits shall be attached to all ground bushings on the conduit and on pull or junction boxes. Connections to ground electrodes and all other underground connections shall be exothermic welded.
- 3.10 Separation of Power and Control Cables – Electric power conductors shall be routed separately from all other conductor types. This may be accomplished by routing power conductors and other conductors in separate raceways.
- 3.11 Earth Electrode System (grounding counterpoise) – The earth electrode system shall be installed as shown on the drawings. The system shall consist of at least four ground rods driven at each corner of the shelter. Ground rods shall be interconnected with a #4/0 AWG bare copper conductor forming a closed loop around the structure. The #4/0 conductor shall be buried a minimum of two feet below the ground surface and the top of the rods shall be a minimum of one foot below the ground surface. All underground metal conduits shall be connected to the earth electrode system with a cable no smaller than #2 AWG. All underground connects shall be made by exothermic welding process



unless otherwise indicated.

A. Ground Rods. - Ground rods shall be driven full length into the earth so that the top is a minimum of 12 inches below finished grade.

B. Other Hardware - Install hardware in a neat manner, parallel or perpendicular or plumb where fastened to surfaces. For surfaces used with adhesive type hardware, clean the surfaces in accordance with the adhesive manufacturer's instructions.

C. Underground Connections. - No part of the underground cable or connections shall be concealed until the Resident Engineer has inspected, tested and approved the ground rods or plates, conductors and connections in that part of the system. Any faulty connections or items shall be corrected or replaced as directed by the Resident Engineer.

**\*\*\*END OF SECTION\*\*\***